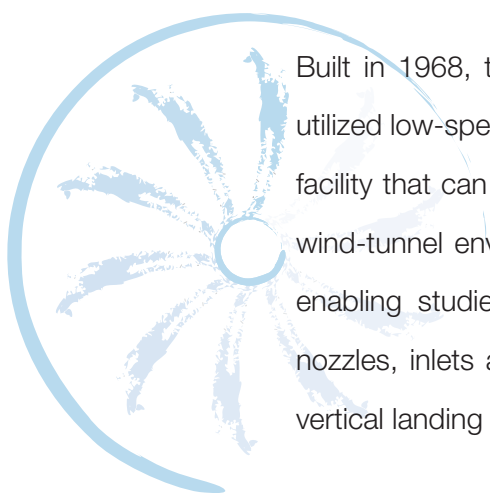




NASA's Aeronautics Test Program

9- by 15-Foot Low-Speed Wind Tunnel

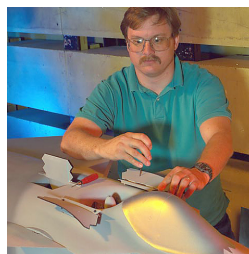


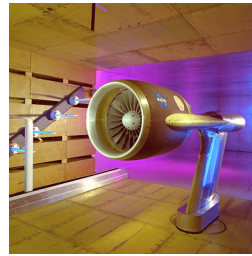
Built in 1968, the 9- by 15-Foot Low-Speed Wind Tunnel (9×15 LSWT) is the most utilized low-speed propulsion acoustic facility in the world. It is the nation's only research facility that can simulate takeoff, approach and landing in a continuous, subsonic-flow, wind-tunnel environment. The 9×15 LSWT offers state-of-the-art acoustic capabilities, enabling studies of aerodynamic performance and acoustic characteristics of fans, nozzles, inlets and propellers, as well as investigations of advanced short takeoff and vertical landing (STOVL) concepts.

Programs supported in the facility have included a wide variety of state-of-the-art commercial aircraft propulsion systems, the Advanced Tactical Fighter, the Joint Strike Fighter, and other military STOVL aircraft applications.



From left to right: Fan trailing edge blowing (FTEB) model, Allison low-speed noise fan, technician at work on the Lockheed STOVL model, and laser imaging of exhaust from the supersonic STOVL hot gas ingestion model.





Facility Benefits

- Operates in both aerodynamic and propulsion cycle modes
- Provides realistic simulations of STOVL aircraft takeoff and rolling landings with a dynamic actuation system
- Offers rotor-alone nacelle test capability making it possible to isolate fan-alone noise
- Can provide 1000- and 2000-hp counter-rotating and 5000-hp high-speed fan drive rigs using heated compressed air
- Employs an experienced staff of technicians, engineers, researchers, and operators
- Offers a conventional, fixed ground plane with a sliding door and a four-degrees-of-freedom, model-integrated support system for hot gas re-ingestion studies

Characteristics

Test section dimensions	9 ft high by 15 ft wide by 28 ft long
Speed	0 to 175 mph
Reynolds number	0 to 1.4×10^6 per ft
Temperature	Ambient to 550 °R
Dynamic pressure	0 to 72 psf
Fuels	Gaseous hydrogen

Data Acquisition and Processing

Steady state ESCORT	256 analog steady-state channels, accuracy ± 0.05 percent of range, once per second update rate of all channels, acquires 1024 parameters from system per second, real-time display of calculations and parameters, high-resolution graphics and display pages, X-window-based system, self contained in facility control room, and offsite access to data
Dynamic	256-channel VME-based, anti-aliasing filter amplifier (132 dB/oct) per channel, online graphics and calculation, and networked PC workstation for runtime analysis
Remote access control room	Automated test article sequencing system, real-time remote access to data, video conferencing in real time, workstations supplied for remote site, and secure network connections provided

Facility Applications

- Engine system noise reduction
- Fan noise prediction codes and measurement methods
- Low-speed flight applications for aircraft
- Advanced propulsion system components
- High-speed and counter-rotating fans
- Airport noise
- Programs and projects supported include Ultra-Efficient Engine Technology (UEET), Quiet Aircraft Technology (QAT), Versatile Affordable Advanced Turbine Engine, Joint Strike Fighter, and Advanced Tactical Fighter

Instrumentation

Pressure measurement	1024 channels and ranges from ± 2.5 to 500 psi
Flow visualization	Pressure-sensitive paint, sheet laser, and high-speed video
Test article controls	Digital model control system with graphical interface

Contact Information

www.aeronautics.nasa.gov/atp

David Stark

NASA Glenn Research Center

Phone: 216-433-2922 · Fax: 216-433-8551

E-mail: David.E.Stark@nasa.gov